Chapter 2: Altered Cellular and Tissue Biology

TRUE/FALSE

1. Non-dividing cells, such as myocardial fibers, are capable of hypertrophy, but not hyperplasia.

   ANS: T PTS: 1 REF: p. 48

2. Dysplasia is a common type of normal cellular adaptation.

   ANS: F PTS: 1 REF: p. 48

3. Hypertrophy and hyperplasia rarely occur together.

   ANS: F PTS: 1 REF: p. 48

4. A patient with a history of smoking has a bronchial biopsy showing that the normal columnar ciliated epithelial cells have been replaced by stratified squamous epithelial cells. The patient is correctly told that this process could be reversed if he quits smoking.

   ANS: T PTS: 1 REF: p. 48

5. Noise, illumination, and prolonged vibrations can cause cellular injury.

   ANS: T PTS: 1 REF: p. 72; p. 73

6. The most common cause of hypoxia is ischemia.

   ANS: T PTS: 1 REF: p. 50

7. Irreversible damage to the myocardium can be detected by elevation in the contractile protein called troponin, which is released from the myocardial muscle.

   ANS: T PTS: 1 REF: p. 52

8. Chemical injuries initiate biochemical reactions that damage cell membrane by decreasing the permeability of the plasma membrane.

   ANS: F PTS: 1 REF: p. 53

9. Dysplastic changes may be reversible, but may become malignant.

   ANS: T PTS: 1 REF: p. 48

10. Melanin protects skin against long exposure to sunlight as well as prevents skin cancer.

ANS: T PTS: 1 REF: p. 75; p. 76

11. Aging is the result of a genetically controlled development program or built-in self-destructive processes.

ANS: T PTS: 1 REF: p. 82

MULTIPLE CHOICE

1. Which type of cell adaptation occurs when normal columnar ciliated epithelial cells of the bronchial lining have been replaced by stratified squamous epithelial cells?
   A. Hyperplasia
   B. Metaplasia
   C. Dysplasia
   D. Anaplasia

   ANS: B PTS: 1 REF: p. 48

2. During ischemia, what effect does the loss of adenosine triphosphate (ATP) level have on cells?
   A. Cells shrink because of the influx of calcium (Ca).
   B. Cells shrink because of the influx of potassium chloride (KCl).
   C. Cells swell because of the influx of sodium chloride (NaCl).
   D. Cells swell because of the influx of nitric oxide (NO).

   ANS: C PTS: 1 REF: p. 51

3. Free radicals play a major role in the initiation and progression of which diseases?
   A. Cardiovascular diseases such as hypertension and ischemic heart disease
   B. Renal diseases such as acute tubular necrosis and glomerulonephritis
   C. Gastrointestinal diseases such as peptic ulcer disease and Crohn disease
   D. Muscular disease such as muscular dystrophy and fibromyalgia

   ANS: A PTS: 1 REF: p. 52

4. How do free radicals cause cell damage?
   A. By stealing the cell's oxygen to stabilize the electron, thus causing hypoxia
   B. By stimulating the release of lysosomal enzymes that digest the cell membranes
   C. By transferring one of its charged, stabilized atoms to the cell membrane causing lysis
   D. By giving up an electron causing injury to the chemical bonds of the cell membrane

   ANS: D PTS: 1 REF: p. 52

5. What is a consequence of plasma membrane damage to the mitochondria?
   A. Enzymatic digestion halts DNA synthesis.
   B. Influx of calcium ions halts the ATP production.
   C. Reduction in ATP production caused by edema from an influx in sodium.
   D. Shift of potassium out of the mitochondria, which destroys the infrastructure.

ANS: B PTS: 1 REF: p. 55

6. What is a consequence of leakage of lysosomal enzymes during chemical injury?
   A. Enzymatic digestion of the nucleus and nucleolus occurs halting DNA synthesis.
   B. Influx of potassium ions into the mitochondria occurs halting the ATP production.
   C. Edema of the Golgi body occurs preventing the transport of proteins out of the cell.
   D. Shift of calcium out of the plasma membrane occurs destroying the cytoskeleton.

   ANS: A PTS: 1 REF: p. 55

7. Lead causes damage within the cell by interfering with the action of:
   A. sodium and chloride.
   B. potassium.
   C. calcium.
   D. adenosine triphosphate (ATP).

   ANS: C PTS: 1 REF: p. 56

8. Which organs are affected by lead consumption?
   A. Heart and blood vessels
   B. Muscles and bones
   C. Pancreas and adrenal glands
   D. Nerves and blood-forming organs

   ANS: D PTS: 1 REF: p. 56

9. How does lead poisoning affect the nervous system?
   A. It interferes with the function of neurotransmitters.
   B. It inhibits production of myelin around nerves.
   C. It increases the resting membrane potential.
   D. It alters the transport of potassium into the nerves during synapse.

   ANS: A PTS: 1 REF: p. 56

10. How does carbon monoxide cause tissue damage?
    A. By competing with carbon dioxide so that it cannot be excreted
    B. By binding to hemoglobin so that it cannot carry oxygen
    C. By destroying the chemical bonds of hemoglobin so it cannot carry oxygen
    D. By removing iron from hemoglobin so it cannot carry oxygen

    ANS: B PTS: 1 REF: p. 56

11. Acute alcoholism mainly affects the _____ system.
    A. hepatic
    B. gastrointestinal
    C. renal
    D. central nervous

    ANS: D PTS: 1 REF: p. 59

12. What effect does fetal alcohol syndrome have on infants?
    A. Failure of alveoli to open at birth

B. Cognitive impairment and facial anomalies
C. Incompetent semilunar values (e.g., aortic and pulmonic)
D. Esophageal stricture and short gut syndrome

ANS: B PTS: 1 REF: p. 59

13. What, if any, is the difference between subdural hematoma and epidural hematoma?
A. There is no difference. These terms may be used interchangeably.
B. A subdural hematoma occurs above the dura, whereas an epidural hematoma occurs under the dura.
C. A subdural hematoma usually is formed from venous blood that collects slowly, whereas an epidural hematoma is formed from arterial blood that collects rapidly.
D. A subdural hematoma usually forms from bleeding within the skull such as an aneurysm eruption, whereas an epidural hematoma occurs from trauma outside the skull such as a blunt force trauma.

ANS: C PTS: 1 REF: p. 61

14. What is the leading cause of injury to and death of patients?
A. Motor vehicle and airplane accidents
B. Fires and burns
C. Drug or alcohol-related accidents
D. Medical errors

ANS: D PTS: 1 REF: p. 62

15. What physiologic changes occur during heat exhaustion?
A. Hemoconcentration occurs because of the loss of salt and water.
B. Cramping of voluntary muscles occurs as a result of salt loss.
C. Thermoregulation fails because of high core temperature.
D. Subcutaneous layers are damaged because of high core temperatures.

ANS: A PTS: 1 REF: p. 70

16. In hypoxic injury, why does sodium to enter the cell and cause swelling?
A. Because the cell membrane permeability increases for sodium during periods of hypoxia
B. Because there is insufficient ATP to maintain the pump that keeps sodium out of the cell
C. Because the lactic acid produced by the hypoxia binds with sodium within the cell
D. Because sodium cannot be transported in the cytosol to the cell membrane during hypoxia

ANS: B PTS: 1 REF: p. 74

17. What is the most common site of lipid accumulation?
A. Coronary and other arteries
B. Kidneys
C. Liver
D. Subcutaneous tissue

ANS: C PTS: 1 REF: p. 75

18. What mechanisms occur in the liver after lipid accumulation in liver cells?
    A. Accumulation of lipids obstruct the common bile duct preventing flow of bile from the liver to the gallbladder
    B. Increased synthesis of triglycerides from fatty acids and decreased synthesis of apoproteins.
    C. Increased binding of lipids with apoproteins to form lipoproteins
    D. Increased conversion of fatty acids to phospholipids

    ANS: B PTS: 1 REF: p. 75

19. What causes hemoprotein accumulations?
    A. Excessive storage of iron, which is transferred from the cells to the bloodstream
    B. Excessive storage of hemoglobin, which is transferred from the bloodstream to the cells
    C. Excessive storage of albumin, which is transferred from the cells to the bloodstream
    D. Excessive storage of amino acids, which are transferred from the cells to the bloodstream

    ANS: A PTS: 1 REF: p. 76

20. Hemosiderosis is a condition in which excess _____ is stored as hemosiderin in cells of many organs and tissues.
    A. hemoglobin
    B. ferritin
    C. iron
    D. transferrin

    ANS: C PTS: 1 REF: p. 76

21. What is the cause of free calcium in the cytosol that damages cell membranes by uncontrolled enzyme activation?
    A. Activation of endonuclease, which interferes with the binding of calcium to protein
    B. Activation of phospholipases, which degrade the proteins to which calcium normally binds
    C. An influx of phosphate ions, which compete with calcium for binding to proteins
    D. Depletion of ATP, which normally pumps calcium from the cell

    ANS: D PTS: 1 REF: p. 77-78 and caption of Fig 2-17

22. What organs are affected by the type of necrosis that results from hypoxia caused by severe ischemia or caused by chemical injury?
    A. Lungs and pulmonary vessels
    B. Brain and spinal cord
    C. Kidneys and heart
    D. Muscles and bones

    ANS: C PTS: 1 REF: p. 79

23. What type of necrosis results from ischemia of neurons and glial cells?

A. Coagulative necrosis
B. Liquefactive necrosis
C. Caseous necrosis
D. Gangrene necrosis

ANS: B PTS: 1 REF: p. 79

24. The mammary glands enlarge during pregnancy primarily as a consequence of:
A. compensatory hyperplasia.
B. hormonal hyperplasia.
C. hormonal anaplasia.
D. hormonal dysplasia.

ANS: B PTS: 1 REF: p. 48

25. What type of necrosis is often associated with pulmonary tuberculosis?
A. Bacteriologic necrosis
B. Caseous necrosis
C. Liquefactive necrosis
D. Gangrenous necrosis

ANS: B PTS: 1 REF: p. 79

26. What type of necrosis is associated with wet gangrene?
A. Coagulative necrosis
B. Liquefactive necrosis
C. Caseous necrosis
D. Gangrene necrosis

ANS: B PTS: 1 REF: p. 80

27. When the heart's workload increases, what changes occur to the myocardial cells?
A. They divide.
B. They increase in size.
C. They increase in number.
D. They undergo metaplasia.

ANS: B PTS: 1 REF: p. 48

28. After ovulation, the uterine endometrial cells divide under the influence of estrogen; this is an example of:
A. hormonal hyperplasia.
B. hormonal dysplasia.
C. hormonal hypertrophy.
D. hormonal anaplasia.

ANS: A PTS: 1 REF: p. 48

29. The abnormal proliferation of cells in response to excessive hormonal stimulation is called:
A. dysplasia.
B. pathologic dysplasia.
C. hyperplasia.

D. pathologic hyperplasia.

ANS: D PTS: 1 REF: p. 48

30. Removal of part of the liver leads to _____ of the remaining liver cells.
A. dysplasia
B. metaplasia
C. compensatory hyperplasia
D. compensatory dysplasia

ANS: C PTS: 1 REF: p. 48

31. What is the single most common cause of cellular injury?
A. Hypoxic injury
B. Chemical injury
C. Infectious injury
D. Genetic injury

ANS: A PTS: 1 REF: p. 50

32. In decompression sickness (the bends), bubbles of _____ form emboli.
A. oxygen
B. nitrogen
C. carbon dioxide
D. hydrogen

ANS: B PTS: 1 REF: p. 71

33. Which cell component is the most vulnerable target of radiation?
A. Plasma membrane
B. Mitochondria
C. Deoxyribonucleic acid (DNA)
D. Golgi body

ANS: C PTS: 1 REF: p. 72

34. What two types of hearing loss are associated with noise?
A. Acoustic trauma and noise-induced
B. High-frequency and low-frequency
C. High-frequency and acoustic trauma
D. Noise-induced and low-frequency

ANS: A PTS: 1 REF: p. 73

35. During cell injury caused by hypoxia, why do sodium and water move into the cell?
A. Because potassium moves out of the cell, and potassium and sodium are inversely related
B. Because the pump that transports sodium out of the cell cannot function because of a decreased in ATP
C. Because the osmotic pressure is increased, which pulls additional sodium across the cell membrane
D. Because oxygen is not available to bind with sodium to maintain it outside of the

cell

ANS: B PTS: 1 REF: p. 51

36. During cell injury caused by hypoxia, why is there an increase in the osmotic pressure within the cell?
    A. Because plasma proteins enter the cell
    B. Because the ATPase-driven pump is stronger during hypoxia
    C. Because sodium chloride enters the cell
    D. Because there is an influx of glucose through the injured cell membranes

    ANS: C PTS: 1 REF: p. 74

37. Which is a description of the characteristics of apoptosis?
    A. A programmed cell death of scattered, single cells
    B. Characterized by swelling of the nucleus and cytoplasm
    C. Has unpredictable patterns of cell death
    D. Results in benign malignancies

    ANS: A PTS: 1 REF: p. 81-82

38. What is the explanation for why cancer increases as one ages and the number of autoantibodies increases with age?
    A. Because the genetic program for aging is encoded in the brain and controlled by hormonal agents
    B. Because free radicals of oxygen that result from oxidative cellular metabolism cause abnormal cell growth
    C. Because the immune function declines with age
    D. Because of the result of DNA damage and inefficiency of cellular repair

    ANS: C PTS: 1 REF: p. 84

MATCHING

Match the terms with the corresponding examples. Terms may be used more than once.

A. Physiologic atrophy
B. Pathologic atrophy
C. Physiologic hypertrophy
D. Pathologic hypertrophy
E. Compensatory hyperplasia

1. Changes in gonads as hormonal stimulation decreases
2. Liver regeneration
3. Increases in the size of the uterus and breasts during pregnancy
4. Thymus gland changes during childhood
5. Causes myocardial enlargement as a result of dilated cardiac chambers

1. ANS: A PTS: 1 REF: p. 46
2. ANS: E PTS: 1 REF: p. 46
3. ANS: C PTS: 1 REF: p. 46

4. ANS: A PTS: 1 REF: p. 46
5. ANS: D PTS: 1 REF: p. 47